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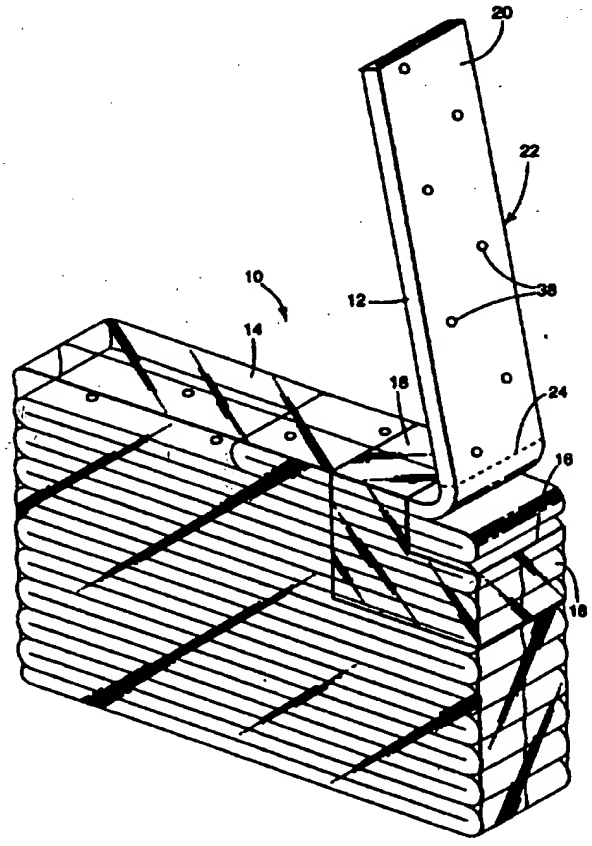
(54) Title: FLEXIBLE DISPENSER AND METHOD FOR DISPENSING SORBENT NONWOVEN WEBS CONTAINING MICROFIBERS

(57) Abstract

A dispenser (10, 40) that includes a flexible enclosure (14, 44) and a nonwoven web (12, 42). The flexible enclosure (10, 40) has a manually puncturable region (16, 46) and an interior. The nonwoven web (12, 42) is disposed in the flexible enclosure's interior in an untangled manner. Nonwoven web (12, 42) contains microfiber and has a first end (20, 50) that is located at the manually puncturable region (16, 46) so that when the region (16, 46) is manually punctured, a person can readily grasp and pull on the first end (20, 50) to dispense a desired length of nonwoven web (12, 42) from the enclosure (14, 44) in a tangle-free manner.



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FLEXIBLE DISPENSER AND METHOD FOR DISPENSING SORBENT NONWOVEN WEBS CONTAINING MICROFIBERS

The present invention pertains to a dispenser and method for dispensing a nonwoven web containing microfibers.

Nonwoven webs that contain microfibers are commonly used to as sorbents for soaking up spilled liquids. The nonwoven webs are available on spools that are contained in corrugated cardboard boxes. The webs can be dispensed from the boxes by puncturing a perforated area on the box, grasping the web, and pulling on the web until the desired length of web is withdrawn from the box. Although these known dispensers provide a somewhat convenient way to dispense nonwoven sorbent webs, the dispensers do have some drawbacks.

One particular drawback is that the dispensers are rather large and bulky. There are voids in the boxes -- namely, at the boxes' corners and at the spool core -- that create dead space. The additional volume that the boxes consume increases storage and shipping costs.

Another drawback is that the dispensers are not flexible. The lack of flexibility prevents them from being easily conformed to fit in a tight area. The corrugated cardboard boxes are also unwieldy, making them somewhat difficult to manage and portage.

A further drawback is that the dispensers require additional parts and process steps for assembling the dispenser and dispensing the web. This adds to product cost and creates additional items, for example, a spool, that must be disposed of when the dispenser is empty.

The present invention overcomes the noted drawbacks for articles that dispense sorbent nonwoven webs that contain microfibers. The dispenser of the present invention is not bulky, inflexible, or unwieldy. The inventive dispenser can be furnished to the user with essentially no dead space. The dispenser is flexible, enabling it to squeezed into a tight area if necessary, and is lightweight and easy to carry. Further, the dispenser of the invention is

relatively easy to manufacture and when completely used leaves l ss materials behind for disposal or recycle. In short, the dispenser of the invention provides a convenient and relatively simple way t dispense sorbent nonwoven webs of microfiber.

In brief summary, the dispenser of the invention comprises: (a) a flexible enclosure having a manually puncturable region and an interior; and (b) a nonwoven web disposed in the flexible enclosure's interior in an untangled manner, the nonwoven web containing microfiber and having a first end that is located in the enclosure's interior at the puncturable region so that when the region is manually punctured, a person can readily grasp the first end and pull thereon to dispense a desired length of nonwoven web from the enclosure in a tangle-free manner.

The method of the invention is similarly advantageous and briefly comprises:

(a) providing a dispenser that includes: (i) a flexible enclosure that has a manually puncturable region and an interior, and (ii) a nonwoven web containing microfiber that is disposed in the flexible enclosure's interior in an untangled manner, the first end of the nonwoven web being located in the enclosure's interior at the puncturable region;

(b) puncturing the enclosure in the manually puncturable region;

(c) grasping the first end of the web and pulling thereon to dispense a desired length of web from the flexible enclosure's interior, the desired length of web being withdrawn from the enclosure's interior in a tangle free condition; and

(d) separating the desired withdrawn length of web from the web remaining in the enclosure's interior to create a new first end that can be subsequently grasped and pulled thereon to dispense a second length of nonwoven web.

The inventive dispenser and method differ from known dispensers and methods in that the n nw ven web is disposed in a flexible enclosure in a tangle-free manner, and the flexible enclosure has a manually-puncturable

region that allows a person to easily pen the enclosure to grasp an end of the nonw ven web. A desired length of web can be withdrawn from the enclosure, and the withdrawn portion may be separated from the web remaining in the dispenser. The remaining web's end is located at the punctured opening so that additional web can be readily withdrawn from the container. The flexible nature of the enclosure eliminates corners that provide dead space. Further, there is no need for a spool to facilitate web withdrawal. The enclosure is relatively lightweight and easily maneuverable so that it can be rotated or otherwise oriented to allow web to be dispensed.

In the drawings:

FIG. 1 is a perspective view of a dispenser **10** that contains a sorbent nonwoven web **12** that contains microfibers;

FIG. 2 is an end view of nonwoven web **12**; and

FIG. 3 illustrates a perspective view of another embodiment of a dispenser **40** in accordance with the present invention.

In the practice of the present invention, a dispenser is provided that readily lends itself to efficient storage and shipment and maintains a sorbent nonwoven web in a safe, clean condition by placement of the nonwoven web in a flexible enclosure that is substantially, and preferably, completely closed. When dispensing is desired, however, the flexible enclosure may be easily punctured using a person's fingers to allow the person to grasp an end of the nonwoven web. The nonwoven web that contains microfibers can be dispensed through the punctured opening by grasping the end and pulling thereon.

FIG. 1 illustrates a dispenser **10** that contains a sorbent nonwoven web **12**. Nonwoven web **12** is located in a flexible enclosure **14**. As the terms are used herein, the term "nonwoven web" means the fibers are intertangled to such an extent that the intertangled mass is handleable by itself as a mat, and the term "flexible" means the enclosure can be squeezeably conformed with a person's hands when the nonwoven web is disposed therein and it will return to essentially its original configuration when the hand pressure is removed. Flexible enclosure **14** has a manually puncturable region **16** (note: in FIG. 1,

region 16 is shown in a punctured condition), which when punctured allows nonwoven web 12 to be withdrawn from enclosure 14. The term "manually puncturable" is used herein to mean able t be punctured simply by pressing the tip of a person's extended index finger at the puncturable region without using additional tools, force, or other means such as a perforation. Because the whole enclosure 14 is typically made from a thin, flexible material, it may be that its entire surface is manually puncturable. Thus, to prevent a tear in region 16 from extending outward into the rest of enclosure 14, manually puncturable region 16 preferably is encompassed by a band 18 that reinforces the enclosure about the punctured area. With the exception of band 18, flexible enclosure 14 preferably consists essentially of one type of material such as a thin plastic film, and thus its whole surface may be manually puncturable except for the reinforced area 18.

Nonwoven web 12 is disposed in flexible enclosure in a untangled manner. In the embodiment illustrated in FIG. 1, the nonwoven web is disposed in the enclosure 14 in a serpentine, untangled pattern. The end 20 of nonwoven web 12 preferably is located in a corner of the flexible enclosure 14. Before any of the web is withdrawn from the enclosure, nonwoven web 12 essentially fills the whole enclosure 14; there is little residual dead space. The enclosure makes a firm, intimate contact with the enclosed web such that its surface is taut or tightly drawn. The taut condition of enclosure 14 allows region 16 to be easily punctured by pressing a person's finger therein with sufficient force. The taut condition also assists in maintaining the untangled condition of the non-woven web. In some instances, the nonwoven web may be compressed before the flexible enclosure is placed about the web. Thus, the volume of the enclosed web may be significantly less in the flexible enclosure than in an unconstrained condition. This provides further volume savings for storage and shipping.

After region 16 is manually punctured, web 12 can be withdrawn from the interior f enclosure 14 by grasping and pulling on end 20. The withdrawn portion 22 can be separated from web remaining in encl sure 14 along a

perforation 24. Upon separating portion 22 from the web in enclosure 14 remaining, a new end is created at punctured region 16. The new-created end also can be handily grasped and pulled n to withdraw another desired length of web from dispenser 10.

Nonwoven web 12 contains microfibers so that mass quantities of liquid can be absorbed. The nonwoven web containing microfibers may take a variety of forms; for example, the web may be in the form of a folded article shown in U.S. Patent 5,256,466, or it may be in the form of an elongate boom shown in U.S. Patent 5,360,654; the disclosures of which are incorporated here by reference.

In FIG. 2, a folded nonwoven sorbent web is illustrated that has a four-layer fold construction 26. The folded web has a casing-like cover or scrim 28 that assists in maintaining the integrity of the nonwoven fibers. This kind of folded construction may be produced in accordance with the teachings in U.S. Patent 5,256,466. Four-layer construction 26 has outer quadrants 30 of microfibrous sheet material 32 that are folded inwardly; that is, toward the face of the material not having scrim 28. These folds are along outer longitudinal fold lines 34 and are followed by a second fold along a central fold line 36, which forms a major fold that produces the configuration shown. The folded nonwoven web 12 can be stabilized in its folded configuration by the use of intermittent bonds 38. Bonds 38 may be in the form of ultrasonic welds or may be formed using a hot-melt adhesive. This folded construction can be subsequently opened in a flat configuration by breaking intermittent bonds 38. Thus, in this embodiment, the web 12 can be opened to form a two-layer or one-layer configuration that covers additional surface area. This may be needed for large liquid spills.

Alternatively, the nonwoven web that contains microfibers may be in the form of an elongate boom such as disclosed in U.S. Patent 5,360,654. The elongated boom disclosed in this patent has a substantially oval cross-section and is formed of multiple adjacent microfiber layers that are bonded to each other by entanglement of the fibers between the adjacent layers. The b om

typically has a diameter of about 50 millimeters (mm) to 30 cm, has a lineal weight of about 20 to 600 grams per meter (g/m), and has an oil sorbency of at least about 5 grams per gram (g/g). Oil sorbency may be determined in accordance with the test outlined in U.S. Patent 5,360,654.

FIG. 3 discloses an alternative embodiment of the invention. As shown in FIG. 3, a dispenser 40 is provided that contains a coiled nonwoven web 42 in a flexible enclosure 44. A manually puncturable region 46 is located centrally in the flexible enclosure 44. A circular reinforced band 48 encompasses manually puncturable region 46. When manually puncturable region 46 is punctured as shown in FIG. 3, a first end 50 of web 42 may be withdrawn from the dispenser's interior.

As opposed to the embodiment illustrated in FIG. 1, the embodiment shown in FIG. 3 has the nonwoven web coiled within the flexible enclosure. As shown in both FIGs. 1 and 3, the nonwoven web essentially fills the whole flexible enclosure. The dispensers are able to consist essentially of the nonwoven web and flexible enclosure. There are no other items such as spools that are required to dispense the web. Further, the web maintains its untangled configuration as web is withdrawn from the enclosure. The nonwoven web is not initially disposed randomly in the enclosure; nor does it become haphazardly arranged in the disclosure throughout its use. The nonwoven web preferably is wound in a serpentine or coiled pattern (the term "wound" is used herein to include either of these orientations). After a portion of the web is torn or otherwise separated from the remaining enclosed web, the newly-created end resides at the punctured opening for subsequent handling by the user and the remaining web retains its wound non-random orientation.

Nonwoven webs used in this invention typically comprise at least 5 weight percent microfiber based on the weight of fibrous material in the nonwoven web. A preferred nonwoven web comprises at least about 20 weight percent microfiber, more preferably at least about 50 weight percent microfiber, and up to 100 weight percent microfiber. The term microfiber means a fiber that has a diameter of less than approximately 10 micrometers.

A preferred nonwoven web contains microfibers that have an average fiber diameter f about 5 to 8 micrometers. The fiber diameter can be calculated according to the method set forth in Davies, C. N., "The Separation of Airborne Dust and Particles", Institution of Mechanical Engineers, London, Proceedings 1B, (1952). The nonwoven web preferably has a substantially uniformly distributed microfibrous structure throughout the whole web. The nonwoven web, typically, has a lineal weight of 0.5 to 2.0 grams per centimeter (g/cm).

The nonwoven web that contains microfibers preferably has a solidity less than about 0.2 and generally greater than about 0.001. The term "solidity" means the volume of fibers per volume of web. Solidity can be calculated using the following formula:

$$S = \frac{\rho_b}{\sum_{i=1}^{n} x_i \rho_i}$$

where: ρ_b is the bulk density of the web, which is the weight of the web divided by the volume of the web;

x_i is the weight fraction of component i;

ρ_i is the density of component i;

S is the solidity; and

n is the number of components.

Preferably, the nonwoven web has a solidity of about 0.02 to 0.15, and more preferably of about 0.05 to 0.1.

The nonwoven web that contains microfibers generally has a basis weight greater than 50 grams per square meter (g/m^2) and up to approximately 600 g/m^2. Typically, the basis weight is in the range of about 100 to 400 g/m^2.

The sorbent capacity of the nonwoven web is generally of 5 to 40 grams H_2O per gram web (gH_2O/g web), and more typically in the range of

about 15 to 20 gH_2O/g web. The sorbent capacity can be measured according to the tests described in International Publication WO 95/00417.

The nonwoven web preferably has sufficient tensile strength to allow the web to maintain its integrity during handling. The web preferably demonstrates a tensile strength when wet which is essentially the same as the tensile strength when dry. The nonwoven web therefore does not significantly lose strength upon sorbing a liquid. In general, the nonwoven web's dry (and preferably wet) tensile strength is greater than about 0.5 Newtons per centimeter (N/cm), typically about 1 to 8 N/cm. Tensile strength can be determined using an INSTRON tensile tester Model 4302 (available from Instron Corporation, having a jaw spacing of 25.4 cm and jaw faces 7.62 cm wide), and a 2.54 cm (one inch) wide dry sample at a crosshead speed of 12.7 cm/min. Wet tensile strength is determined by saturating the web in water before placing the web in the tensile tester.

The microfibers in the nonwoven web are entangled as a coherent mass of fibers. The fibers can be entangled using, for example, a melt-blowing process, where a molten polymer is forced through a die and the extruded fibers are attenuated by adjacent high velocity air streams to form an entangled mass of blown microfiber (BMF). A process for making BMF webs is disclosed in Wente, Van A., "Superfine Thermoplastic Fibers" 48 *Industrial Engineering Chemistry*, 1342 et seq (1956); or see Report No. 4364 of the Naval Research Laboratories, published May 25, 1954, entitled "Manufacture of Super Fine Organic Fibers" by Wente, Van A.; Boone, C.D.; and Fluharty, E.L. A nonwoven web containing microfiber also may be made using solution blown techniques such as disclosed in U.S. Patent 4,011,067 to Carey or electrostatic techniques such as disclosed in U.S. Patent 4,069,026 to Simm et al.

Polymeric components that may be used to form a BMF web include polyolefins such as polyethylene, polypropylene, polybutylene, poly(4-methylpentene-1), and polyolefin copolymers; polyesters such as polyethylene terephthalate (PET), polybutylene terephthalate, and polyether

ester copolymers such as HYTREL available from Dupont Co., Elastomers Division, Wilmington, Delaware; polycarbonates; polyurethanes; polystyrene; polyamides such as nylon 6 and nylon 66; and thermoplastic elastomer block copolymers such as styrene-butadiene-styrene, styrene-isoprene-styrene, styrene-ethylene/butylene-styrene, available from Shell Oil Company, Houston, Texas, under the trademark KRATON. Combinations of the above polymeric microfibers, or blends of the polymeric components, may also be employed. For example, a blend of polypropylene and poly(4-methyl-1-pentene) can be used to make a nonwoven web that contains microfiber (see U.S. Patent 4,874,399 to Reed et al.), or the web may contain bicomponent microfiber such as the polypropylene/polyester fibers (see U.S. Patent 4,547,420 to Krueger et al.) Polymers useful for forming microfibers from solution include polyvinyl chloride, acrylics and acrylic copolymers, polystyrene, and polysulfone. A nonwoven web preferably comprises microfibers made from polyolefins, particularly fibers that contain polypropylene as a major fiber component, for example, greater than ninety weight percent, because such fibers provide the web with good resilient properties in conjunction with good sorptive properties.

In addition to microfibers, the nonwoven web may contain other fibers such as crimped or uncrimped staple fibers. The addition of staple fibers can impart better conformability and improved loft to the nonwoven web. Staple fibers are fibers of a given fineness, crimp, and cut length. Fineness is generally given in units of tex, grams per kilometer (g/km), a linear density. Crimp is characterized by the number of bends per unit length of fiber (crimps/centimeter). Cut length is the overall length of the cut filaments. Staple fibers employed in this invention generally have fineness of about 0.1 to 10 tex, preferably about 0.3 to 4 tex, crimp densities of about 1 to 10 crimps/cm, preferably at least 2 crimps/cm, and cut lengths in the range of about 2 to 15 centimeters, preferably about 2 to 10 centimeters. Webs that contain staple fibers may be prepared according to procedures discussed in U.S. Patent 4,988,560 to Meyer et al., U.S. Patent

4,118,531 to Hauser, and U.S. Patent 3,016,599 to Perry. When added to a n nwoven web that contains microfibers, staple fibers typically comprise approximately 10 to 50 weight percent of the fibrous material in the nonwoven web.

A nonwoven web that contains microfibers as carrier fibers (and optionally staple fibers) may also contain microfiber microwebs as sorbent structures in the nonwoven web. Microfiber microwebs have a relatively dense nucleus with numerous individual fibers and/or fiber bundles extending therefrom. The extended fibers and fiber bundles provide an anchoring means for the microfiber microwebs when they are incorporated into the nonwoven web. The nucleus of the microfiber microwebs preferably is in the range of about 0.2 to 2 mm. The extending fibers and/or fiber bundles preferably extend beyond the nucleus to provide an overall diameter of about 0.07 to 10 mm, more preferably about 0.2 to 5 mm. The diameter of the microfibers in a microfiber microweb can be similar in diameter to, or smaller than, the microfibers of the carrier microfiber web. The microfibers of the microfiber microwebs can be smaller in diameter than is normally considered suitable for use in microfiber webs because the staple fibers or the carrier microfibers in the nonwoven webs are major contributors to the strength of the nonwoven webs. Preferably smaller in diameter than the carrier microfibers of the nonwoven web, the microfibers in the microfiber microwebs can be at least 20 percent smaller and more preferably at least 50 percent smaller than the carrier microfibers in the nonwoven web. Fibers having smaller diameters can increase the capillary action in the microfiber microwebs to enhance sorptive properties for retaining liquids. When employed in a nonwoven web that contains microfibers, microfiber microwebs generally are present in the nonwoven web in the range of about 10 to 80 weight percent based on the weight of fibrous material. Microfiber microwebs and their manufacture are described in U.S. Patent 4,813,948 to Insley, the disclosure of which is incorporated here by reference.

A nonwoven web that contains microfibers and optionally staple fibers and/or microfiber microwebs may also include other ingredients in addition to the fibrous material. For instance, the nonwoven web f microfibers may be loaded with discrete solid particles capable of interacting with (for example, chemically or physically reacting with) a liquid to which the particles are exposed. Such particles can remove a component from the liquid by sorption, chemical reaction, or amalgamation or a catalyst may be employed to convert a hazardous fluid to a harmless fluid. An example of a particle-loaded nonwoven web of microfiber is disclosed in U.S. Patent 3,971,373 to Braun, where discreet solid particles of activated carbon, alumina, sodium bicarbonate, and/or silver are uniformly dispersed throughout and are physically held in the web to sorb a fluid; *see also*, U.S. Patent 4,100,324 to Anderson et al. and U.S. Patent 4,429,001 to Kolpin et al. Also, additives such as dyes, pigments, fillers, surfactants, abrasive particles, light stabilizers, fire retardants, absorbents, medicaments, et cetera, also may be added to the web by introducing such components to the fiber-forming molten polymers or by spraying them onto the fibers after the web has been collected.

The flexible enclosure may take the form of essentially any material capable of providing a manually puncturable region and retaining the nonwoven web therein. Preferably the flexible enclosure is in the form of a transparent plastic so that a person can see how much web remains in the dispenser. The transparent plastic can be, for example, a multi-layer coextruded polyolefin film that is sufficiently elastic to resist inadvertent tears but when in taut condition can be punctured with a person's fingers. The plastic desirably has good cold flex properties that keep it pliable at low temps (e.g. -40°F) without cracking or becoming brittle. The plastic also should form a strong seal line that does not fail under normal use conditions. Typically, the plastic is about 0.006 to 0.05 mm (approximately 25 to 200 gauge) thick and preferably has a ball burst impact strength of 5 to 25 j ules, more preferably 10 to 20 joules. Preferably, the plastic has a tensile strength of 70 to 140 mega pascals (MPa)

(approximately 10,000 t 20,000 psi), and more preferably of 80 to 110 MPa (approximately 12,000 to 15,000 psi). The plastic preferably also has a tear propagation of 5 to 20, more preferably 6 to 16. The modulus of elasticity of the enclosure typically is 500 to 1050 MPa (approximately 75,000 to 150,000 psi at 73°F), and more preferably is 650 to 725 MPa (95,000 to 105,000 psi at 73°F).

Preferably the plastic is a heat-shrink material. Heat-shrink plastics can form an enclosure that tightly fits about the nonwoven web. The plastic typically has an unrestrained linear thermal shrinkage of 10 to 25 percent at 200°F (93°C). An example of a suitable heat-shrink plastic includes Cryovac Type MPD2055 Film, 100 gauge. This heat-shrink plastic can be reinforced about the manually-puncturable region by a reinforcing tape such as Scotch Brand, Type 351 tape from 3M.

The following standardized ASTM test methods may be used to determine the noted parameters.

Parameter	***ASTM Test Method***
Ball burst impact strength	D-3420 (Method A; pendulum capacity 50 joules; 12.7 millimeter radius hemispherical impact head)
Tensile strength	D-882 (Method A)
Elongation at break	D-882 (Method A)
Modulus of elasticity	D-882 (Method A)
Tear propagation	D-1938
Unrestrained shrink	D-2732 (at 200°F)

Claims:

1. A dispenser for dispensing a nonwoven web that contains microfibers, the dispenser comprising:

(a) a flexible enclosure having a manually puncturable region and an interior; and

(b) a nonwoven web disposed in the flexible enclosure's interior in an untangled manner, the nonwoven web containing microfiber and having a first end that is located in the enclosure's interior at the puncturable region so that when the region is manually punctured, a person can readily grasp the first end and pull thereon to dispense a desired length of nonwoven web from the enclosure in a tangle-free manner.

2. The dispenser of claim 1, wherein the manually puncturable region is encompassed by a band that reinforces the enclosure about the manually puncturable region.

3. The dispenser of claims 1-2, wherein essentially the whole surface of the flexible closure is manually puncturable except for the band.

4. The dispenser of claims 1-3, wherein the nonwoven web is disposed in the enclosure in a serpentine or coiled pattern.

5. The dispenser of claims 1-4, wherein the first end of the nonwoven web is located in a corner of the flexible enclosure.

6. The dispenser of claims 1-5, wherein there is essentially no residual dead space in the enclosure, and the enclosure is in taut contact with the nonwoven web.

7. The dispenser f claims 1-6, wherein the nonwoven web is compressed before the flexible enclosure is placed about the web.

8. The dispenser of claims 1-7, wherein the nonwoven web is in a folded condition.

9. The dispenser of claims 1-8, wherein the nonwoven web is in a form of an elongate boom that has a substantially oval cross-section and is formed of multiple, adjacent microfiber layers that are bonded to each other by entanglement of the fibers between the adjacent layers.

10. The dispenser of claims 1-9, wherein the boom has a diameter of about 50 millimeters to about 30 centimeters, has a lineal weight of about 20 to 600 grams per meter, and has an oil sorbency of at least 5 grams per gram.

11. The dispenser of claims 1-10, wherein the nonwoven web is disposed in the flexible enclosure's interior in a coiled pattern, and wherein the manually puncturable region is located centrally in the flexible enclosure.

12. The dispenser of claim 11, wherein a circular band encompasses the manually puncturable region.

13. The dispenser of claims 1-12 consisting essentially of the nonwoven web and the flexible enclosure, wherein there is essentially no dead space in the interior of the flexible enclosure, and the flexible enclosure is in a taut condition.

14. The dispenser of claims 1-13, wherein the nonwoven web contains at least 5 weight percent microfiber based on the weight of fibrous material in the nonwoven web.

15. The dispenser of claim 14, wherein the nonwoven web contains at least 20 weight percent microfiber based on the weight of fibrous material in the nonwoven web.

16. The dispenser of claims 1-15, wherein the nonwoven web has a solidity of 0.02 to 0.15.

17. The dispenser of claims 1-16, wherein the nonwoven web has a basis weight greater than 50 grams per square meter, has a sorbent capacity of 5 to 40 grams H_2O per gram web, and has a dry tensile strength of 1 to 8 Newtons per centimeter.

18. The dispenser of claims 1-17, wherein the nonwoven web contains melt-blown microfiber, and wherein the flexible enclosure includes a transparent plastic.

19. The dispenser of claims 1-18, wherein the transparent plastic is a multi-layered coextruded polyolefin film that is sufficiently elastic to resist inadvertent tears but when in a taut condition can be manually punctured.

20. The dispenser of claims 1-19, wherein the flexible enclosure includes a plastic film that is about 0.006 to 0.05 millimeters thick and has a ball burst impact strength of 5 to 25 joules.

21. The dispenser of claims 1-20, wherein the plastic has a tensile strength of 70 to 140 mega pascals, has a tear propagation of 5 to 20, and has a modulus of elasticity of 500 to 1,050 mega pascals, and wherein the flexible enclosure includes a heat-shrink material that has an unrestrained linear thermal shrink of 10 to 25 percent at 200°F.

22. A method of dispensing a nonwoven web that contains microfiber, the method comprising:

(a) providing a dispenser that includes: (i) a flexible enclosure that has a manually puncturable region and an interior, and (ii) a nonwoven web containing microfiber that is disposed in the flexible enclosure's interior in an untangled manner, the first end of the nonwoven web being located in the enclosure's interior at the puncturable region;

(b) puncturing the enclosure in the manually puncturable region;

(c) grasping the first end of the web and pulling thereon to dispense a desired length of web from the flexible enclosure's interior, the desired length of web being withdrawn from the enclosure's interior in a tangle free condition;

(d) separating the desired withdrawn length of web from the web remaining in the enclosure's interior to create a new first end that can be subsequently grasped and pulled thereon to dispense a second length of nonwoven web.

23. The method of claim 22, wherein steps (c) and (d) are repeated until all of the non-entangled web is withdrawn from the enclosure's interior.

24. The method of claims 22-23, wherein the nonwoven web maintains its untangled configuration as web is withdrawn from the enclosure.

25. The method of claims 22-24, wherein the nonwoven web is wound in a nonrandom orientation within the flexible enclosure.

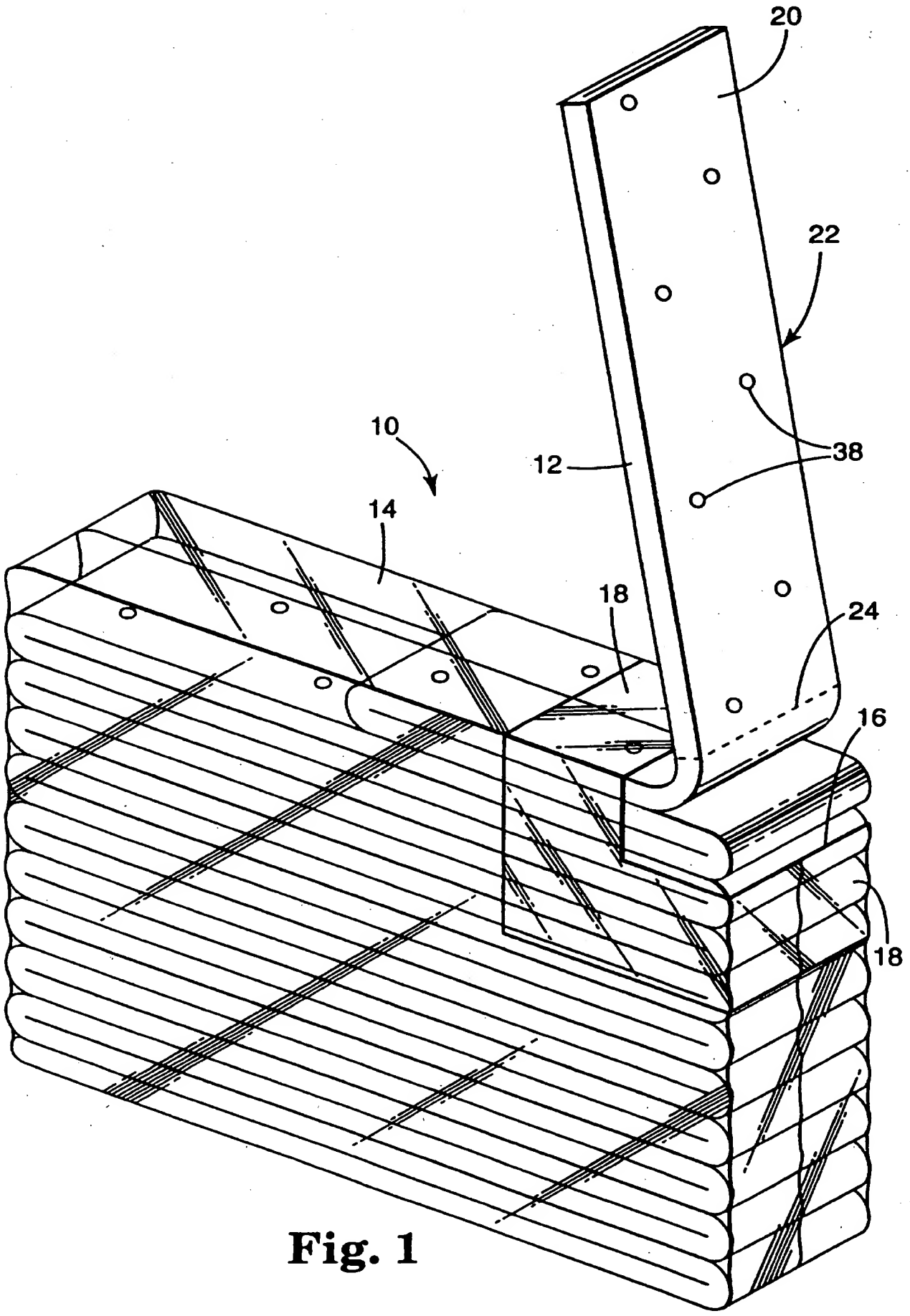

Fig. 1

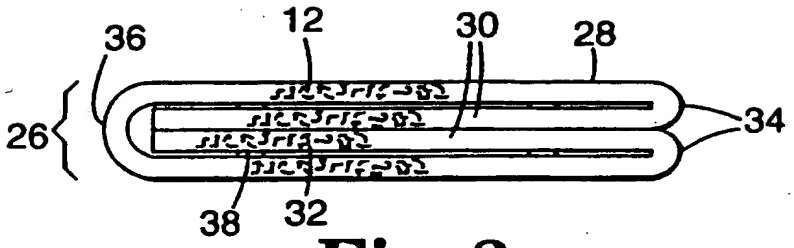

Fig. 2

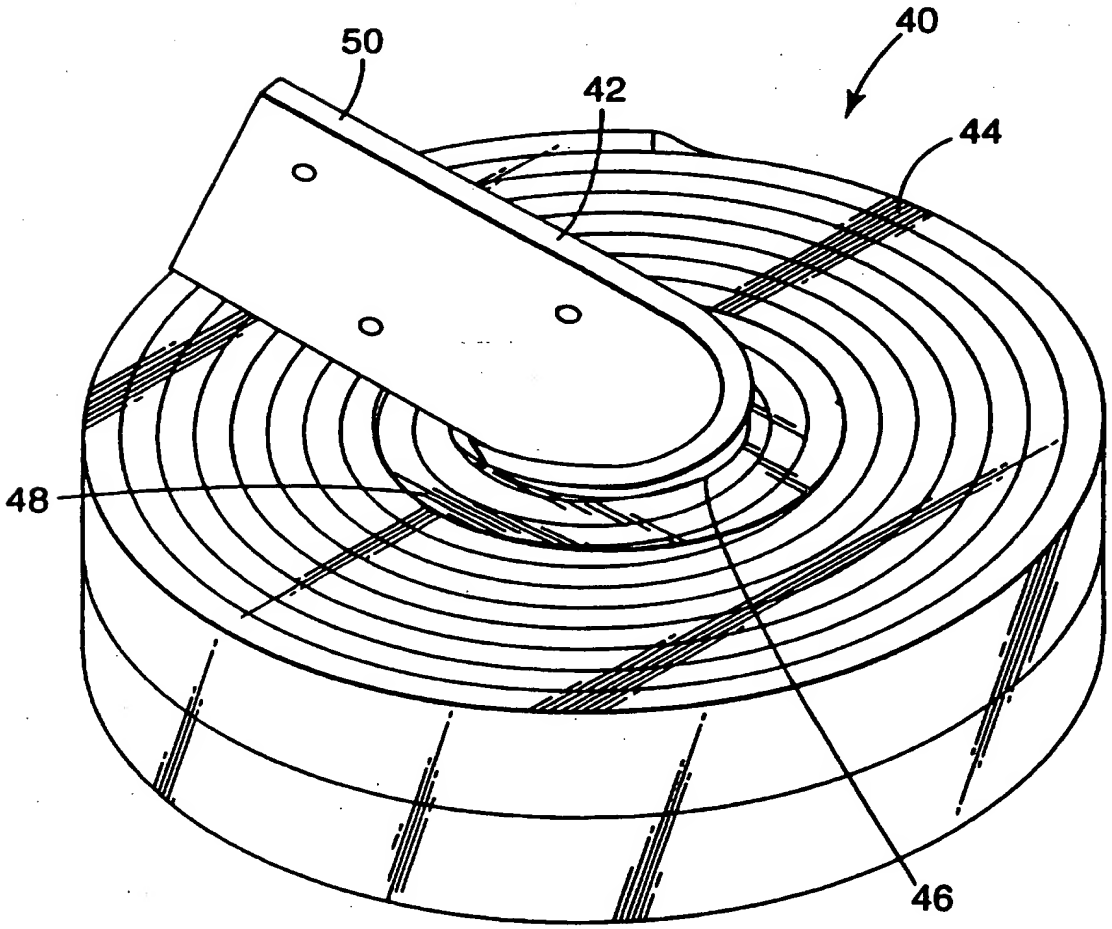

Fig. 3

INTERNATIONAL SEARCH REPORT

Inter ial Application No
PCT/US 95/14371

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 B65D83/08 B65D85/16 B65D75/58

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE,A,42 39 574 (VP-SCHICKEDANZ) 26 May 1994 see column 3, line 27 - line 36; figure 3	1,4,6, 11,13, 22-25
A	FR,A,2 417 282 (SOTRALOSE) 14 September 1979 see page 2, line 16 - page 3, line 14; figures	1,4,6, 11,13, 18,21-25
A	EP,A,0 391 460 (PROCTER & GAMBLE) 10 October 1990 see claim 1; figures 2,3	1,5-7

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
14 March 1996	21.03.96

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl, Fax (+ 31-70) 340-3016	Bridault, A

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/US 95/14371

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